

STATEMENT ON PROGRESS AND FUTURE PLANS IN THE  
RESEARCH ON UTILIZATION OF ATOMIC RADIATIONS  
FOR CONTROLLING THE SCREW-WORM

Prepared for Senator Lister Hill  
by the  
Bureau of Entomology and Plant Quarantine  
U. S. Department of Agriculture

Progress to Date

Laboratory research on the screw-worm during fiscal years 1950 and 1951 has indicated a promising lead for possible control or eradication of the screw-worm in the Southeast. This involved the use of X-ray treatments of the male insect to destroy its reproductive potential.

It was found that normal females of the screw-worm mate once only and when mated to the X-ray treated males they deposit eggs which do not hatch.

Although these laboratory studies suggested a new approach to screw-worm control, it was obvious that the practical possibilities of the method could not be estimated without conducting certain actual experiments with flies in screw-worm infested areas. The success of the method hinges on certain facts that must be obtained:

1. We must know if the irradiated flies react in the same manner when released as they do in the laboratory.
2. The number of screw-worm flies which exist in different areas during various seasons of the year must be estimated with reasonable accuracy in order to determine if it is practical to rear, irradiate, and release sufficient numbers of flies to compete effectively with those already present in nature.
3. Information must be obtained on the rate and distance that released insects will fly so that we can better interpret the information obtained in our research and plan proper ways to release the insects in the event the method is used in an eradication program.

To provide means for conducting the field experiments, Congress appropriated \$20,000 to the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture for the fiscal year 1951 to initiate the investigations. Field research was started in Florida in October 1951. Sanibel Island, near Ft. Myers was selected for special studies. Screw-worm flies reared in the laboratory were treated with X-rays and released at intervals of 1 to 2 weeks during a period of 6 months.



STATEMENT ON PROGRESS AND FUTURE PLANS IN THE  
RESEARCH ON UTILIZATION OF ATOMIC RADIATIONS  
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by the  
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Eggs of the insect were then collected from wounds of animals on the island. By comparing the number of egg masses which hatched and those which did not hatch we have determined that some of the X-ray treated males we released mated with the wild females already present on the island and made them incapable of reproducing. The degree of efficacy of the released flies cannot be accurately estimated, however, because the island is not sufficiently isolated to prevent some of our released flies from leaving the island and to keep normal wild flies which may have previously mated, from flying to the island from the mainland. We have, therefore, obtained encouraging results on the first point listed for study but additional information must be obtained.

Some of the flies released on Sanibel Island were treated with radioactive tracers so that eggs from these flies could be identified when deposited on animals. By comparing the number of radioactive egg masses collected on wounds of animals with the number which were not radioactive we have estimated the approximate population of screw-worms present per square mile on the island. This information obtained on the island, together with information obtained by operating fly traps on the mainland, suggests that it would be economically feasible to rear and release at least 5 times as many irradiated flies as occur in nature. These preliminary findings indicate that a very favorable answer has been obtained on the second point which had to be determined.

No new precise information has been obtained on the third point which concerns the rate and distance that the screw-worm flies migrate. However, there is every indication from previous information and from the observations made since October 1951 that the insect disperses rapidly when released. We believe this habit would be advantageous in an actual control program but the rapid dispersion of the insects we release in small areas makes it extremely difficult to estimate if our released sterile males are competing successfully with the wild fertile males present in nature.

While the field studies were under way, further laboratory research has continued with the help of the Oak Ridge National Laboratory. A significant development in this research is the discovery that gamma rays are equally as effective in sterilizing the flies as are X-rays. Gamma-ray treatments would be much more practical and economical than X-ray treatments. The Oak Ridge Laboratory has loaned us pilot scale equipment to use in our research program.

#### Summary of Progress

To date we feel that we have made more rapid progress than expected when the work was started in October 1951. On the basis of available data we have more confidence in the feasibility of the new approach



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to control or eradicate the screw-worm in the Southeast. We must emphasize, however, that this is an exceedingly complex research problem, and we have not obtained sufficient information to determine if the method will provide a practical means for eliminating the pest. The type of research program required and an estimate of the scope of the actual eradication program, if the method proved feasible, was discussed in Dr. W. L. Popham's letter of May 4, 1951 to Senator Lister Hill, copy of which is attached.

In the letter referred to, a three year research program requiring \$20,000 during the first year and \$40,000 each for two additional years, was proposed to obtain information needed to determine if an eradication program was feasible and practical.

#### Future Plans

Considerable effort has been made to locate a suitable island isolated from areas where large numbers of screw-worms occur, in order that small scale experiments can be conducted which will determine the efficacy of releasing sterile screw-worm flies. Such an island has not yet been found and it appears unlikely that we can locate one that is suitable. The alternative will be to release flies at regular intervals during the course of several months in an experimental area on the mainland in the Southeast. Available information suggests that such area would have to be at least 50 miles in diameter in order to minimize the rate of migration of our released sterile flies out of the area and to minimize the number of fertile wild flies that will migrate into the area from outside of the experimental area. An experiment on this scale will be more difficult and costly than on small isolated islands. Research during the next fiscal year (1953) will be designed to determine a number of points as follows:

1. How large an area will be required to test the effectiveness of released sterile flies.
2. What time of year will be best for initiating such experiment.
3. How often and at what interval of distance should flies be released.
4. How many flies must be released per square mile to accomplish expected results.
5. Locate and conduct pretreatment studies in the area selected for a large scale experiment.



to control or eradicate the new-born in the Southwest. We must emphasize, however, that this is an exceedingly complex research problem, and we have not obtained sufficient information to determine if the method will provide a practical means for eliminating the pest. The type of research program required and an estimate of the scope of the actual eradication program, if the method proved feasible, was discussed in Dr. W. L. Rogers's letter of May 11, 1951 to Senator Hiram Hill, copy of which is attached.

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2. What time of year will be best for initiating such experiments.
3. How often and at what intervals of distance should flies be released.
4. How many flies must be released per square mile to accomplish expected results.

5. Locate and conduct pilot-scale studies in the area selected for a large scale experiment.

It is hoped that the results of the pilot-scale studies will be sufficient to determine the feasibility of the new program.

To carry out this program a variety of small scale experiments will be necessary. These will be conducted on Sanibel Island or other suitable island and on the mainland during the next year. In addition, studies will have to be continued to determine the distribution and population density of the insect during various periods of the year.

By fiscal year 1954, we hope to have necessary information to initiate the type of experiment which will determine if the irradiation method can be used to eliminate the screw-worm.





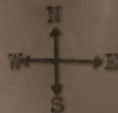




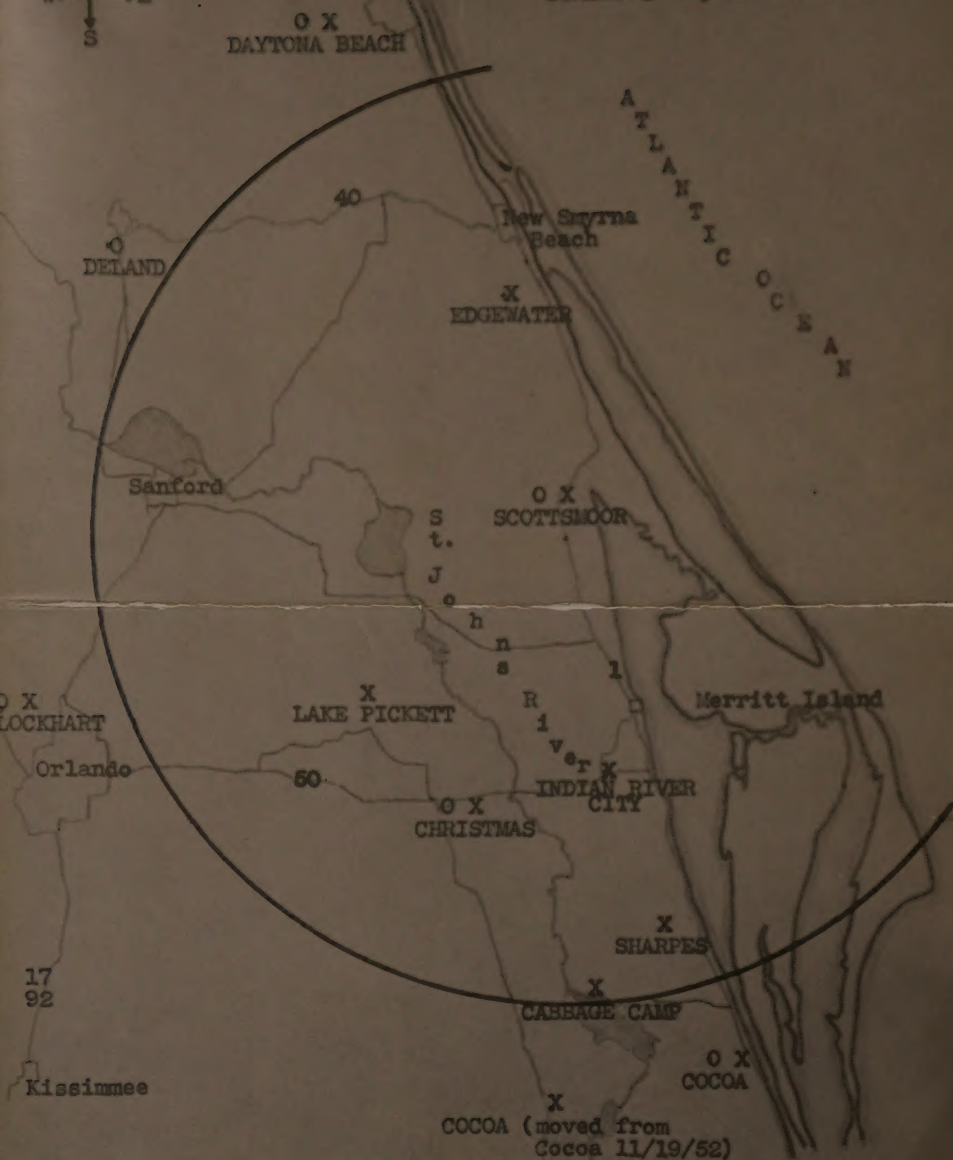








SCALE: 1" equals 8 miles



RELEASE AREA OF STERILE SCREW-WORM PUPAE AND ADULTS  
FLORIDA - SEPTEMBER, OCTOBER, NOVEMBER, 1952

Legend: O Liver-baited traps; X Goat Pens

